Entergy

Entergy Nuclear South
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-3093
Tel 504-739-6715
Fax 504-739-6698
rmurill@entergy.com

Robert J. Murillo
Licensing Manager
Waterford 3

W3F1-2007-0059

December 11, 2007

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Response to Request for Additional Information on Request for Alternative W3-ISI-004 – Proposed Alternative to Second Interval ISI Examinations
Waterford Steam Electric Station, Unit 3
Docket No. 50-382

REFERENCES:
1. Entergy letter dated August 7, 2007, *Request for Alternative W3-ISI-004 Proposed Alternative to Second Interval ISI Examinations* (CNRO-2007-00027)
2. NRC letter dated November 30, 2007, *Waterford Steam Electric Station, Unit 3 – Request for Additional Information on the Request for Alternative W3-ISI-004, Proposed Alternative to Second Interval Inservice Inspection Examinations*

Dear Sir or Madam:

Per Reference 1, Entergy proposed an alternative to the inspection requirements of ASME Code, Section XI IWA-2430(a) and IWB-2500(a) for seven (7) dissimilar metal welds found in the Reactor Coolant System cold leg piping at Waterford Steam Electric Station, Unit 3 (W-3). In a telephone call held on November 19, 2007, Entergy discussed with the staff the draft Request for Additional Information (RAI) and agreed to provide a response to the RAI by December 11, 2007. On November 30, 2007, Entergy originally received the NRC letter requesting a response to the RAI. Our response to the RAI is contained in Attachment 1.

A047
NRR

This RAI response includes a revision to the commitment specified in Reference 1 and stated in Attachment 3. If you have any questions or require additional information, please contact Ron Williams at 504-739-6255.

Sincerely,

RJM/RLW/
Attachments:

1. Response to Request for Additional Information (RAI) for Request for Alternative W3-ISI-004 – Proposed Alternative to Second Interval ISI Examinations
2. Weld Repair Records and Fabrication Details
3. List of Regulatory Commitments

cc: Mr. Elmo E. Collins, Jr.
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

NRC Senior Resident Inspector
Waterford Steam Electric Station Unit 3
P.O. Box 822
Killona, LA 70066-0751

U. S. Nuclear Regulatory Commission
Attn: Mr. N. Kalyanam
Mail Stop O-07D1
Washington, DC 20555-0001

Wise, Carter, Child & Caraway
ATTN: J. Smith
P.O. Box 651
Jackson, MS 39205

Louisiana Department of Environmental Quality
Office of Environmental Compliance
Surveillance Division
P. O. Box 4312
Baton Rouge, LA 70821-4312

American Nuclear Insurers
Attn: Library
Town Center Suite 300S
29th S. Main Street
West Hartford, CT 06107-2445

Attachment 1

W3F1-2007-0059

Response to Request for Additional Information (RAI)

for Request for Alternative W3-ISI-004 – Proposed Alternative

to Second Interval ISI Examinations

Waterford Steam Electric Station, Unit 3
Response to Request for Additional Information
for Request for Alternative W3-ISI-004 – Proposed Alternative
to Second Interval ISI Examinations

Reference 1 - Entergy letter dated August 7, 2007, *Request for Alternative W3-ISI-004 Proposed Alternative to Second Interval ISI Examinations* (CNRO-2007-00027)
Reference 2 - NRC letter dated November 30, 2007, *Waterford Steam Electric Station, Unit 3 – Request for Additional Information on the Request for Alternative W3-ISI-004, Proposed Alternative to Second Interval Inservice Inspection Examinations*

RAI 1 - *MRP-109 utilizes a crack growth rate with a stress intensity threshold value of 9 MPa-m$^{0.5}$. MRP-109 evaluations were limited to flaws with aspect ratios of 2:1 and 6:1. Larger aspect ratio flaws, up to 21:1 have been identified during examinations of other dissimilar metal welds. The flaws assumed in MRP-109 to achieve a 1 gallon per minute (GPM) leak rate may not be indicative of a realistic flaw shape and therefore, may overly predict the time from a 1 GPM leak until failure of the weld. Therefore, alternate analyses other than MRP-109 are necessary to support the conclusions made in the proposed alternative W3-ISI-004. Please provide results from the advanced finite element analysis regarding predicted flaw shapes and growth.*

Entergy Response:

Reference: Response from Westinghouse letter CWTR3-07-254 dated 12/3/07 and authored by Warren Bamford, team member on the expert panel for MRP-216, Rev 1 (spring 08 advance FEA).

The MRP-109 crack growth analysis was performed using the MRP-21 Crack Growth Rate (CGR) formula. MRP-21, issued in 2000, reported an effort to predict a Crack Growth Rate (CGR) for Alloy 182 weld metal. The MRP-21 formula used the crack growth rate model that was developed for Alloy 600 material, and increased it by a factor of five to account for the expectation that Alloy 182 might crack five times faster than Alloy 600. The MRP-21 formula includes an assumed threshold stress intensity factor below which cracks will not propagate by primary water stress corrosion cracking (PWSCC), which is expected because this formula is derived from the formula for Alloy 600, rather than from Alloy 182 test data.

MRP-115, issued in late 2004, reported an effort to predict a Crack Growth Rate (CGR) for Alloy 182, Alloy 132, and Alloy 82 weld metals. MRP-115 was a significantly more sophisticated effort than MRP-21, and developed a formula for CGR specific to weld metals based on fitting curves to available test and field data for the weld metals. No threshold could be defined from the available data, so it was not assumed. The crack growth rate curve was otherwise very similar to MRP-21.

Since the MRP-109 crack growth analysis was performed using the MRP-21 CGR formula, the results of MRP-109 had to be reconciled to the new knowledge documented in MRP-115. This was reconciled in MRP-113 and led to changes to the results of MRP-109. The CGR formula from MRP-115 results in higher (than MRP-21) crack growth for applied stress intensity factors below about 15 MPa$\sqrt{m}$, and lower crack growth for applied stress intensity factors above about

15 MPa√m. This resulted in a reduced time for a crack to grow from an initial flaw to a through wall flaw, and increased the time for a through wall flaw to grow to a critical flaw size. Since it would take longer for a through wall flaw to grow to a critical flaw size using the MRP-115 CGR formula, use of the MRP-109 reported times (which use the MRP-21 CGR formula) will not overly predict the time from a 1 GPM leak until failure of the weld due to the stress intensity threshold.

While it is true that larger aspect ratio indications have been identified, this is true only for circumferential orientations, since axial flaws can only grow to the end of the weld. Therefore, this discussion will concentrate on the circumferential orientation. In general, the advanced crack growth calculations showed significantly larger margins than those completed using standard techniques. For example, for the Wolf Creek Relief line, which had an initial indication depth of 26 percent of the wall thickness, and length of 43% of the circumference, the advanced analysis showed it took three times as long for the flaw to penetrate the pipe wall. Furthermore, the flaw broke through only locally, thus demonstrating leak before break.

For circumferential flaws, the advanced finite element analysis completed for the pressurizer nozzles showed that larger aspect ratio flaws grew around the pipe, and then eventually penetrated the wall locally. This behavior was due to the residual stress in the welds, and occurred for all the residual stress scenarios considered. Using the variable flaw shape, flaws typically took much longer to penetrate the wall compared to a constant shape flaw, and in many cases arrested before penetration, due to the residual stress distribution. When the flaw did penetrate the wall, it did so locally, thus promoting leakage before rupture. Since the flaws typically got longer before penetrating the wall locally, this behavior was not sensitive to the initial flaw shape.

The evaluation of the RC Pump (RCP) safe ends and the Safety Injection (SI) nozzle safe ends also demonstrated large margins. These safe-ends are at a temperature of T_{cold} and thus have a very low probability of a PWSCC crack initiating and lower growth rate than that predicted for the pressurizer region.

The RCP safe ends are also a very large diameter, and therefore there is a very large margin between leak and break. As stated in the original submittal, and reproduced below, the critical flaw size determined in MRP-109 for these locations is very large, over 29% of the circumference and through wall, with a total critical length of at least 33 inches (see table below). A one gpm leak results from a through-wall flaw of just over 2 inches, so there is a very large margin between leak and break. Therefore, alternative analysis of this configuration is not needed to support the proposed alternative. Using the advanced analysis methodology (MRP-216) would be expected to show even greater margin, but MRP-216 was developed primarily to deal with smaller pipe sizes where the margins were not so large. Given the large margin available, addition analysis is not needed for the large diameter RCP nozzles.

Weld Analyzed (MRP-109)	WF3 ISI Weld No.	1 GPM Leak Crack Size	Time for Thru-wall Crack[1] to Reach Critical Flaw Size[2]	Critical Flaw Size[2] - Circumferential Thru-wall Length
RCP Suction	11-002 13-016	2.65 inches	> 40 Years	36.5 inches (32% of Circ.)
RCP Discharge	12-012 14-002	2.24 inches	> 40 Years	33.2 inches (29% of Circ.)

Notes:

1. "Through-wall crack" is defined as producing a 1 gpm leak.
2. "Critical flaw size" is the flaw size that would result in failure under a specified load calculated using fracture mechanics.

The margin will be somewhat less for the smaller diameter safety injection nozzles (12 inch diameter) using traditional analysis methodology. The Pressurizer surge nozzle model is the same diameter and thickness as the SI nozzle, so it was used to support the proposed alternative, because the SI nozzle safe ends were not specifically treated in MRP-109. The MRP-109 results showed that more than 18 months were required for a flaw in the governing CE-design surge line with a one GPM leak to reach a critical flaw size. Since the SI nozzles are similar in size, but operate at much lower temperatures and with lower loads, this result was judged to be conservative. A view of the level of conservatism can be obtained by considering the extensive advanced analysis runs made for the surge nozzle butt weld and documented in MRP-216.

The advanced analysis for the surge nozzle cases included a large range of loadings. These analyses are judged to be bounding because thermal stratification loads do not exist for the SI nozzles. The most relevant case in MRP-216 is case 18a, which is a surge nozzle with low bending loads, but typical residual stresses. The postulated flaw in this case was 360 degrees around, which conservatively envelopes all flaw shapes, and 10% of the pipe wall. For this case, the crack arrested before penetrating the wall, thus demonstrating that the structural integrity is not challenged. This conclusion would apply directly to the SI nozzles and supports the proposed alternative.

While the original proposed alternative was based on MRP-109 results, consideration of the more advanced work in MRP-216 shows that the original basis was conservative.

RAI 2 - *As residual stress is as important as operating temperature for flaw initiation and growth, please address the estimated residual stress in the welds and how this level of stress affects susceptibility to primary water stress-corrosion cracking. Please provide weld fabrication details and any documented repairs made to the nozzle welds and any other details which could affect the weld residual stress profile for those welds which examination deferral is requested.*

Entergy Response:

Reference: Response from Westinghouse letter CWTR3-07-254 dated 12/3/07 and authored by Warren Bamford, team member on the expert panel for MRP-216, Rev 1 (spring 08 advance FEA).

Welding residual stresses were used in the evaluations documented in RAI 1 above, so their impact on the results was directly assessed. Local repairs do increase the residual stresses, but the effect is local, which promotes leak before break. Regardless of repairs, the primary driving factor for PWSCC is temperature, and the low temperature at these locations of interest plays a major part in our assurance that the proposed alternative is appropriate. There have been no leaks in the industry on large bore cold leg temperature butt welds.

MRP-109 did consider residual stress in the crack growth analysis, but they used generic recommendations from the ASME Section XI flaw evaluation paper published in the Journal of Pressure Vessel Technology, Vol. 108, dated August 1986. The MRP-109 residual stress profiles did not assume any weld repairs – the ASME recommendation values used a maximum of 30,000 psi residual stress for both axial and circumferential directions. This is detailed in section 4.2 of MRP-109.

MRP-109 left some unanswered questions regarding residual stress profiles, and the effects of weld repairs. To address these questions, MRP-106 determined residual stress profiles using FEA models (Dominion Engineering). The results of MRP-106 were bounded by the MRP-109 analysis except for welds that had been repaired from the inside diameter (ID).

MRP-106 performed analysis that determined the residual stress distributions in as-designed butt welds and in butt welds that had been repaired from the inside surface. The results showed that the stress distribution for as-designed butt welds with no repairs results in relatively low stresses at the inside surface, and would be expected to sustain axial cracking over circumferential cracking. Welds that had repairs from the inside surface result in higher residual stresses at the inside surface, and the direction of stress would equally support axial or circumferential crack orientation.

With the weld repair residual stress information from MRP-106, the question of how a weld repair would affect the results of MRP-109 remained. To evaluate this, MRP-114 was issued. MRP-114, section 3.2, defined the weld repairs assumed for the analysis. MRP-114 only evaluated reactor vessel outlet nozzle and pressurizer surge nozzle piping welds, but both of these geometries are similar to those of interest here.

MRP-114 evaluated the effect of weld repairs on dissimilar metal (DM) butt welds. This report documents that, for weld repairs made from the outside of the pipe, the resulting weld contains beneficial weld residual stress with respect to crack growth, similar to that for the as-welded condition. For this reason, effects of weld repairs performed from the outside of the pipe have no significant effect on the conclusions reported in MRP-109. However, repairs that are performed from the inside surface of the pipe result in significantly higher axial and circumferential residual tensile stresses in the repair area. These higher residual stresses in the repair area can create conditions that lead to shorter cracking times than would be expected for un-repaired welds (MRP-109). Two different ID weld repair configurations could be expected. One is a relatively shallow repair that extends for the full 360 degree circumference of the pipe, and the other is a relatively deep repair over a limited distance. In this report, the circumferential length of the weld repairs analyzed were equivalent to 30, 60, 90, and 360 degrees of the pipe circumference. The weld residual stress decreases rapidly with distance from the weld repair (both circumferentially and axially).

It is unlikely that a flaw will initiate and grow uniformly for the entire 360 degree circumference. This is due to the non-uniform nature of residual and applied stress, and that there is no initiation mechanism identified in the PWR fleet similar to the condition that existed at the Duane Arnold recirculation inlet nozzles (BWR). Because of these factors, it is unlikely that a flaw will initiate for the full 360 degrees around the pipe at the ID surface of the weld, and any flaw that does initiate is not expected to grow uniformly for the full 360 degrees around the pipe. This would result in cracks that would produce leaks consistent with the analysis documented in MRP-109. The advanced analysis further supports this conclusion.

Regarding those welds that experience a relatively deep repair over a limited distance, the initiated flaws would tend to grow through-wall within the weld repair region, and, except for very high piping load cases, would grow through the wall beyond the weld repair for only short distances. Because of this tendency for the flaw to grow through wall in the localized area of the repair, and due to the fact that the weld residual stress decreases rapidly with distance from the weld repair, the results of MRP-109 remain valid for evaluating the safety significance of this Relief Request.

In summary, the residual stresses used in the assessments which form the basis of the proposed alternative bracket those which are expected in the locations of interest. Even with consideration of any potential repairs in the regions of interest, and the residual stresses which may have resulted, the conclusion remains that the integrity of the welds of interest will be maintained, and that the proposed alternative is a reasonable approach.

The weld repair records and fabrication details for these regions have been examined, and the results are tabulated in Attachment 2. A review of the repair records was performed and does not alter Entergy's basis for the proposed alternative.

RAI 3 - *Can any of the welds be made to achieve at least a 90 percent American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Appendix VIII ultrasonic examination coverage through grinding or machining the weld surface to change the profile and allow for satisfactory ultrasonic transducer contact with the surface?*

Entergy Response:

The welds in question have a cast stainless steel safe-end that limits the examination to one side and the outside diameter (OD) configuration will not allow good ultrasonic coupling. Grinding/machining will improve the OD configuration, but since the cast stainless steel safe-end on one side of the weld precludes examination from that side, grinding/machining will not assist in achieving at least 90% qualified Code coverage.

RAI 4 - *Have any of the other reactor coolant pump suction or discharge or safety injection tie to reactor coolant loop dissimilar metal welds been examined using ASME Code, Section XI, Appendix VIII methods? If so, what percentage of coverage was obtained and what were the results?*

Entergy Response:

None of the DM welds were examined to ASME Code Section XI Appendix VIII methods. The welds were examined to the requirements of ASME Code Section XI pre-Appendix VIII requirements. There were no reported unacceptable indications.

RAI 5 - *How much radiological dose is estimated to install the seven weld overlays during 15th refueling outage (RF15)? How many additional welders and nondestructive examination personnel would be required to maintain personnel dose to within site as-low-as-reasonably achievable (ALARA) limits? What are the site ALARA limits?*

Entergy Response:

To install these seven (7) cold leg DM weld overlays of interest during RF15, the radiological dose is estimated to be 20 REM. This total radiological dose is in addition to the 15 REM estimated to install the nine (9) pressurizer and hot leg DM weld overlays currently scheduled during RF15.

Currently, W3 has scheduled seven welding crews with approximately forty-two (42) vendor craft personnel per 12 hour shift operating up to seven welding machines simultaneously to support installation of weld overlays on nine (9) pressurizer and hot leg nozzles. To install the additional seven nozzle weld overlays, Entergy and the vendor would essentially use the same experienced craft to install the additional seven large bore cold leg weld overlays during RF15 to the maximum extent permitted by dose to the welders and NDE technicians. Additional craft personnel would be necessary due to (1) four of the seven welds are 30" diameter RCP nozzles that are over twice the size previously experienced by vendors in PWR overlay work; and (2) W3 is at least the fourth plant that will be serviced by the vendor in the spring. This would require some exchange of welders who have commitments for similar work later in the year.

The site ALARA administrative dose limit is 2 REM per year per individual.

RAI 6 - *Have vendors been contacted to determine the welding resources available for application of the seven additional weld overlays during RF15? What vendors were contacted and what welding resources are available?*

Entergy Response:

Waterford 3 has contacted our welding vendor, Welding Services Inc. (WSI), and Westinghouse regarding their ability to install weld overlays on the seven (7) cold leg nozzles during RF-15. With four (4) of these seven (7) cold leg nozzle being 30 " diameter RCP suction and discharge nozzles, the installation of DM weld overlays on this size pipe nozzle would be a first time evolution for our vendor on a PWR. Entergy is not aware of a PWR that has had a weld overlay applied on this size nozzle near cast stainless steel.

WSI resources are currently scheduled to install DM weld overlays on nine (9) Alloy 600 butt welds in the reactor coolant system for the pressurizer and hot leg during RF-15. This is the largest number of overlays performed by WSI at one time on this type of nozzle. It is Entergy's understanding that the present demand for qualified nuclear welders and NDE technicians involved in overlay work in the spring of 2008 is extremely challenging to all nuclear vendors in the industry that perform this service.

RAI 7 - *How much time would it take to engineer the seven weld overlays? How much time would it take a vendor to develop mock-ups and qualify procedures, equipment, and personnel? Please provide the basis for the estimates.*

Entergy Response:

It is estimated that it would take four (4) months to complete the engineering work on the seven (7) weld overlays discussed in this Request for Alternative. As part of the engineering work, the sizing calculations, design drawings, limited mock-up and NDE are being planned as contingency for the seven (7) cold leg nozzles and are part of the Waterford 3 RF15 emergent scope. However, the four months are required to complete mock-ups, equipment fabrication, integrated testing demonstration and personnel qualifications that were not included in the RF15 scope. The four month duration is based on current planning experience with the nine (9) pressurizer and hot leg nozzle weld overlays, ranging in size from 2" to 14", that are scheduled for installation during RF15.

If this Request for Alternative is not approved and overlay work becomes necessary, then the complete scope of engineering work remaining for the seven (7) welds would need to be accomplished on an emergent basis. The schedule to complete the mock-ups, equipment fabrication, integrated testing demonstration and personnel qualifications would be accelerated to the maximum practical, assuming engineering resources could be made available at both the vendor and utility.

Similar equipment, processes and procedures for the currently planned outage overlay scope (9 welds) would be used as applicable and applied to the added scope. Although the components would be the same, the design of the larger welding machines would be a first time evolution and entail accepting risk during their production.

Currently, RF15 overlay design and analysis is in progress at Structural Integrity for each of the nine (9) welds. In parallel, NDE instruments are being developed and welding machines & mock-ups are in fabrication at the WSI site. There are approximately fifty-five (55) documents consisting of drawings, calculations, weld travelers, procedures, etc, being prepared for the currently scheduled nine (9) RF15 weld overlays. This is an eight month effort that was begun in early August 2007 and scheduled for completion by early April 2008 to support a April 27, 2008 RF15 commencement. As noted above, some of this work is in-progress for the seven (7) additional weld overlays on the four (4) 30" RCP nozzles and three (3) Safety injection nozzles. This includes only the sizing calculations and drawings. If the seven welds are included in the outage scope approximately 30 additional documents would be required. When completed these documents require review and comment resolution prior to commencement of integrated mock-up testing and craft training.

RAI 8 - *What are the thicknesses of seven welds, and what is the range of overlay thicknesses qualified under the Performance Demonstration Initiative procedures?*

Entergy Response:

A. The thicknesses of the seven (7) Dissimilar Metal Welds are as follows:

ISI Weld #	Description	Weld Thickness
11-002	RCP-2A suction	3.53"
12-012	RCP-2A discharge	3.20"
13-016	RCP-2B suction	~3.35"
14-002	RCP-2B discharge	~3.38"
10-008	SI Loop 1B	~1.49"
12-009	SI Loop 2A	1.40"
14-006	SI Loop 2B	1.35"

B. The range of overlay thicknesses qualified under the Performance Demonstration Initiative Program (PDI) procedures, specifically under PDI-UT-8 Rev. 0, Addenda 0, span the following thickness and diameters. These ranges are the maximum ranges after applying field tolerances as allowed by Section XI, Appendix VIII.

<u>Present Capability - Overlay Dimensions</u>

- Minimum Diameter = 1.8"
- Maximum Diameter = unlimited
- Minimum Thickness = 0.05"
- Maximum Thickness = 1.35"

Current PDI procedures are only qualified for examination of the upper 25% of the original weld and base material. Current PDI procedures are not qualified for the examination of the cast base material.

RAI 9 - *What duration outage extension is estimated to permit installation of preemptive structural weld overlays on the seven welds? Please provide the basis for the estimates.*

Entergy Response:

Waterford 3 estimates that to perform the weld overlays on an additional seven (7) cold leg nozzles will add approximately thirty (30) additional days to the current refueling outage duration of twenty-five (25) days.

The estimated outage extension is based on the currently planned installation of nine (9) DM weld overlays on the pressurizer and hot leg nozzles. These nozzles range in size from 2" to 14". The nine (9) nozzle weld overlay work scheduled for RF15 will take approximately sixteen (16) days. The estimated duration is the time following scaffold installation through NDE. This duration includes equipment set up, calibration, testing as well as the welding, machining and NDE. This duration does not include scaffolding erection, insulation and whip restraint/hanger removal, instrument and electrical determinations of the Pressurizer heater cables and instrument tubing, reactor coolant system resistance temperature detectors (RTD), and the associated restoration work.

Seven welding crews with approximately forty-two (42) WSI craft per 12 hour shift (total craft 84), will have up to seven welding machines running simultaneously. Total dedicated vendor and Entergy support is estimated at approximately one hundred (100) personnel. This team would be used to perform the overlay work on the currently scheduled nine (9) weld overlays followed by the additional seven (7) cold legs, if required.

Due to space limitations inside the RCS biological shields, the significant amount of welding activity on the RCS is concentrated in a small area. Thus, the additional seven (7) weld overlays, consisting of four (4) - 30" RCP nozzle welds and three (3) -12" safety injection nozzles, would need to be performed in series with the currently scheduled nine (9) weld overlay work and take an additional 30 outage days to complete.

RAI 10 - *Please revise the commitment to submit a request for alternative and commit to either examine the welds with an ultrasonic method acceptable to the NRC or to install a structural weld overlay on the welds during the Waterford 3 16th refueling outage.*

Entergy Response:

Entergy is hereby changing the commitment contained in Reference 1 to submit a request for alternative and commit to either examine the welds with an ultrasonic method acceptable to the NRC or to install a structural weld overlay on the welds during the Waterford 3 16th refueling outage. The change in the commitment is contained in Attachment 3.

Attachment 2

W3FI-2007-0059

Weld Repair Records and Fabrication Details

Weld Repair Records and Fabrication Details

1. Original Construction Weld Repair Information

Table 13 – Rejection Notice Summary
(From Westinghouse Report LTR-PCAM-07-65 [3.6])

Note: All table regular text is a duplicate of the Westinghouse report data; italicized text indicates supplemental information to Westinghouse report data.
[#] Indicates Reference Number. A distinction was made between weld repairs performed on the butter or weld prep and the Alloy 82 butt weld as indicated in the left column. The butt welds were performed after final stress relief, therefore subsequent weld repairs would generate a higher susceptibility to localized PWSCC than weld repairs to the butter or weld prep due to residual stress. The butter/weld prep repairs are included so that all weld repairs associated with the DM welds would be represented.

DM Weld Repair? (Versus Butter/ Weld Prep Repair)	***WF3 Weld ID***	**RN Number**	**Part Description**	**Defect Description**	**Repair Description**	***Notes***
NO	*14-006 Loop 2B SI Nozzle*	1629	Loop 2B upper CL piping assembly	Damaged weld prep on safety injection nozzle.	Grind and PT the ground area. Weld repair, machine and PT.	*Part No 771-1301 [3.1] [3.2]*
NO	*11-002 Loop 2A RCP Suction*	2140	Unspecified CL safe-end buttering	Unacceptable PT indications on safe end buttering.	Machine to remove indications; PT inspect. Butter the safe-end Alloy 182. Machine and inspect.	*Part No. 731-102-3 [3.3]*
YES	*13-016 Loop 2B RCP Suction*	2299	Loop 2B lower cold leg suction elbow to safe-end weld	Excessive RT indications found in weld seam 1407-771-D.	Repair-welded with Alloy 182; details not available.	*Part No. 771-1403-4 Seam No. 1407-771-D [3.3]*
YES	*11-002 Loop 2A RCP Suction*	2793	Loop 2A lower CL suction elbow to safe-end weld	Excessive RT indications after first cycle; multiple circ. Locations.	Grind out indications and repair Alloy 182.	*Part No. 771-1403-3 Seam No. 1407-771-C [3.3]*
YES	*13-016 Loop 2B RCP Suction*	3046	Loop 2B lower CL. Suction elbow to safe-end weld	Excessive RT indications; multiple locations.	Defects removed; weld repairs effected.	*Part No. 771-1403-4 Seam No. 1407-771-D [3.3]*
NO	*13-016 Loop 2B RCP Suction*	3071	Loop 2B lower CL. Suction elbow safe-end	Overall safe-end length now shorter than allowed by dwg.	Provide additional length via weld buildup; machine, inspect and butter safe-end Alloy 182.	*Part No. 771-1403-4 [3.3]*
YES	*14-006 Loop 2B SI Nozzle*	3886	Upper CL safety injection nozzle	RT after 2nd cycle unacceptable; residual slag remains in weld.	Repaired; details not recoverable.	*Part No. 771-1301 Seam No. 1303-771 [3.2]*
YES	*12-009 Loop 2A SI Nozzle*	3900	Upper CL safety injection nozzle	Excessive RT indications in buttering after first cycle.	Grind out defects and PT. Weld repair Alloy 182.	*Part No. 771-901 Seam No. 903-771 [3.4]*

Note: All available original construction rejection notices were reviewed for applicability to the seven subject welds. This table contains information on relative weld repairs to the subject dissimilar metal welds or butter. The first column distinguishes whether a weld repair was performed on the Alloy 82 butt weld. The information contained in Table 13 is derived from all available data at Westinghouse and is a 'best effort' presentation of applicable weld repairs.

2. Fabrication Details

The root pass design shown in Figure 1 is typical of all seven locations. A weld prep was machined onto the mating surfaces on both components and the Alloy 82 butt weld was performed with a subsequent ID back-groove-and-fill. The design drawing for the Loop 2A RCP discharge DM weld and the Loops 2A and 2B RCP suction DM welds depict butter on the cast stainless steel safe end (Figure 1, weld ID's 11-002, 12-012, and 13-016). The design drawing for the Loop 2B RCP discharge DM weld and the Loops 1B, 2A, and 2B safety injection nozzle DM welds do not depict butter on the cast stainless steel safe end (Figure 2, weld ID's 14-002, 10-008, 12-009, and 14-006). References [3.2], [3.3], [3.4], [3.5]

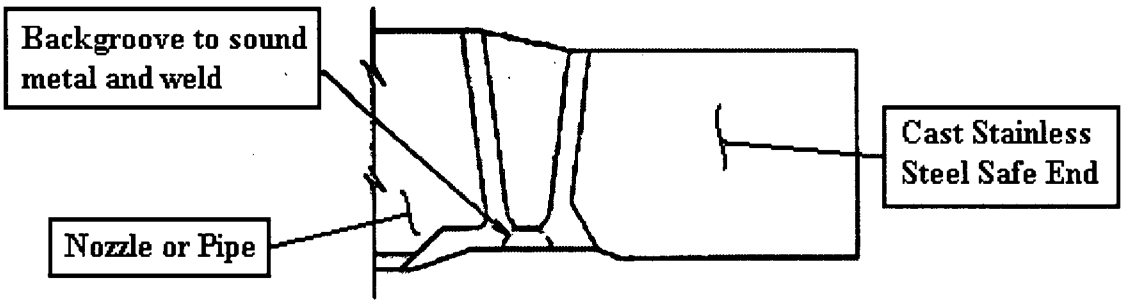

Figure 1
(Applies to Loop 2A RCP discharge DM weld and the Loops 2A and 2B RCP suction DM welds)

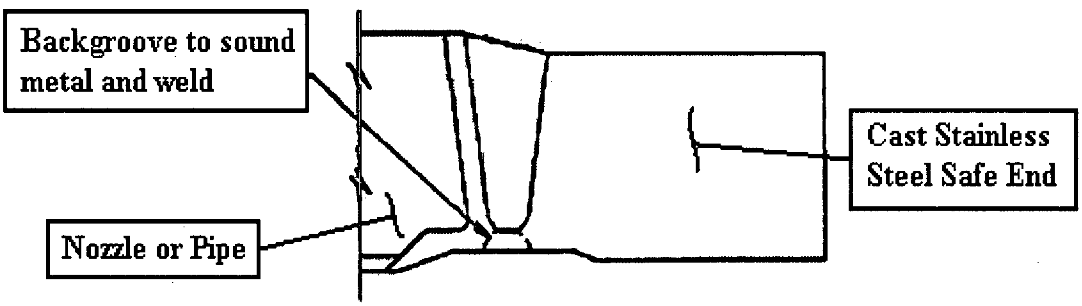

Figure 2
(Applies to Loop 2B RCP discharge DM weld and the Loops 1B, 2A, and 2B safety injection nozzle DM welds)

3. References

3.1 Drawing 1564-930 (Vendor drawing 74470-771-012), "Primary Pipe Assembly"
3.2 Drawing 1564-931 (Vendor drawing 74470-771-013), "Primary Pipe Assembly"
3.3 Drawing 1564-932 (Vendor drawing 74470-771-014), "Primary Pipe Assembly"
3.4 Drawing 1564-918 (Vendor drawing 74470-771-009), "Primary Pipe Assembly"
3.5 Drawing 1564-929 (Vendor drawing 74470-771-011), "Primary Pipe Assembly"
3.6 Westinghouse Report LTR-PCAM-07-65, "PWROG PA-MSC-0233 Task 2 Deliverable Waterford Unit 3"
3.7 Vendor drawing 74470-771-001, "General Arrangement Waterford III Piping"

Attachment 3

W3FI-2007-0059

List of Regulatory Commitments

List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONT COMP	
Entergy will submit for NRC Staff approval a request for alternative that will commit to either examine the welds with an ultrasonic method acceptable to the NRC or to install a structural weld overlay on the deferred dissimilar metal welds contained in Request for Alternative W3-ISI-004 during the Waterford 3 16th refueling outage.	X		October 30, 2008